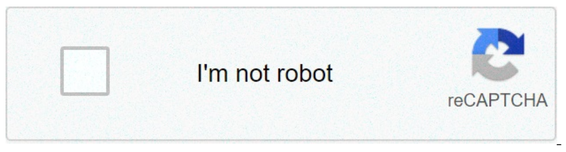

Continue

Kn/m3 to pcf

The S.I. and English Systems The System International (International Standard System) of units uses units of Newtons (N) and meters (m) for its units of force and length. The English System (imperial, engineering) uses pounds (lb, force) and feet (ft) or inches (in). The unit of time, seconds (sec) is the same in both systems. Below are various tables that convert units from English to S.I. and back (e.g., 1 meter = 39.4 inches), as well as common conversions within each system (e.g., 1 ft = 12 inches). In general, the Conversion Factors are listed to 6 significant digits (even though your answer should not be that extensive). A useful interactive conversion tool, with many more units, is Engineering Exchange's online Unit Conversions program. Another tool, by Joshua Madison, may be downloaded here (no length conversions; remember, pressure has the same units as stress). Some useful approximate conversions: A pound is 4.45 newtons; a meter is 39.4 inches. Multiply psi (or ksi) by ~7 to convert to kPa (or MPa) 4a. Lengths, Areas and Volumes - English Units to S.I. Units and Back To Convert From multiply to get / To Convert from multiply by to get Length inches, in 25.4 millimeters, mm 0.0393701 inches, in inches, in 0.0254 meters, m 39.3701 inches, in feet, ft 0.3048 meters, m 3.280840 feet, ft yards, yd 0.9144 meters, m 1.09361 yards, yd miles, mi 1.609344 kilometers, km 0.621371 miles, MI Area square inch, in2, si 645.16 square millimeters, mm2 0.00155000 square inch, in2 square inch, in2, si 0.00064516 square meter, m2 1550.00 square inch, in2 square feet, ft2, sf 0.09290304 square meter, m2 10.7639 square feet, ft2, sf square yard, yd2, sy 0.836127 square meter, m2 1.19599 square yard, yd2 Volume cubic inch, in3, ci 16387.064 cubic millimeters, mm3 61.0237 x 10-6 cubic inch, in3 cubic inch, in3, ci 16.387064 cubic centimeters, cc, cm3 0.06102374 cubic inch, in3 cubic foot, ft3, cf 0.0283168 cubic meters, m3 35.3147 cubic foot, ft3, cf cubic yard, yd3, cy 0.764555 cubic meters, m3 1.30795 cubic yard, yd3 gallon, gal. 3.78541 Liters, l = 0.001 m3 0.264172 gallon, gal. Other Geometric Properties of a Cross-section Moment of Inertia, in4 416231 mm4 = 10-12 m4 2.402 x 10-6 in4 Section Modulus, in3 16387.064 mm3 = 10-9 m3 61.0237 x 10-6 in3 Excerpts/adaptions from: Aluminum Design Manual, Aluminum Association, Inc., October, 1994, Table A1-1, pg. Appendix 1-4. Underlined values units represent an "exact" conversion factor. - Top - Geometric Conversions - Force and Stress Conversions - Same System Conversions - - Pounds, Newtons & Kilograms; Density - Temperature - 4b. Force, Stress, Loads and Mass - English Units to S.I. Units and Back To Convert From multiply to get / To Convert from multiply by to get Force pound, lb 4.44822 newton, N 0.224809 lb kilopound, kip = 1000 lb 4.44822 kilonewton, kN = 1000 N 0.224809 kip = 1000 lb Stress [Force per Unit Area] pounds per sq. ft, lb/ft2, psf 47.8803 pascals, Pa = N/m2 0.0208854 lb/ft2, psf psf 0.0478803 kilopascal, kPa, kN/m2 20.8854 psf kilopounds per sq. ft, ksf 47.8803 kPa 0.0208854 ksf pounds per sq. inch, psi 6894.76 Pa 0.000145038 psi psi 6.89476 kPa 0.145038 psi kilopounds per sq. in, ksi 6.89476 megapascal, MPa = MN/m2 = N/mm2 0.145038 ksi Bending Moment, Torque [Force x Length] pound-foot, lb-ft 1.35582 newton-meter, N-m 0.737561 lb-ft pound-inch, lb-in 0.112985 N-m 8.850732 lb-in Distributed (or "Running") Load [Force per Unit Length] pounds per (linear) foot, plf 14.5939 newtons per meter, N/m 0.06852178 plf pounds per (linear) inch, pli 175.127 N/m 0.00571015 pli Excerpts/adapted from: Aluminum Design Manual, Aluminum Association, Inc., October, 1994, Table A1-2, pg. Appendix 1-4. - Top - Geometric Conversions - Force and Stress Conversions - Same System Conversions - - Pounds, Newtons & Kilograms; Density - Temperature - 4c. Same System Conversions; Things you should know From Multiply by to get / To Convert from multiply by to get Length in 0.083333 feet, ft 12 in ft 0.333333 yards, yd 3 ft ft 1.89393 x10-4 miles, MI 5280 feet, ft mm 0.001 meters, m 1000 mm cm 0.01 m 100 cm Area in2 0.00694444 ft2 144 in2 ft2 0.111111 yd2 9 ft2 Time second, s 0.0166666 minutes, min 60 s second 2.77777 x10-4 hour, h 3600 s second 1.1574 x 10-5 day, d 86400 s minutes, min 6.9444 x10-4 day,d 1440 min Weight lb 0.005 ton (U.S.) 2000 lb - Top - Geometric Conversions - Force and Stress Conversions - Same System Conversions - - Pounds, Newtons & Kilograms; Density - Temperature - 4d. Force and Weight; and Density - English Units to S.I. Units and Back In the S.I. system, weight is often expressed in kilograms (a mass); in the United States, weight is expressed in pounds (a force). Be careful! The force of 1 kg. is 9.81 N (in standard gravity). To Convert From Multiply by to get / To Convert from multiply by to get Pounds, Newtons and Kilograms pounds lb 4.44822 Newton, N 0.224809 lb lb 0.453592 kg 2.20462 lb N 0.101972 kg 9.80665 N lb 0.0310 slug (lb-s2/ft) 32.2 lb Weight Density (force/volume); including kilogram force lb / ft3 0.157087 kilonewtons per kN/m3 6.36590 lb / ft3 lb / in3 271.447 kN/m3 0.00368 lb / in3 lb / in3 0.000578703 lb / ft3 1728 lb / in3 N / m3 0.101972 kg / m3 9.80665 N / m3 kN / m3 101.972 kg / m3 0.0090665 kN / m3 lb / ft3 16.0185 kg / m3 0.0624279 lb / ft3 Mass Density (mass/volume) slug / ft3 515.379 kg / m3 0.0019403 slug / ft3 - Top - Geometric Conversions - Force and Stress Conversions - Same System Conversions - - Pounds, Newtons & Kilograms; Density - Temperature - 4e. Temperature Conversions To Convert From function to get / To Convert from function to get degrees Fahrenheit, F (5/9)(F-32) degrees Centigrade C 1.8 C + 32 degrees Fahrenheit, F deg. F F+459.67 degrees Rankine, R R-459.67 deg. F deg. Centigrade C+273.15 Kelvin, K K-273.15 deg. Centigrade change in degrees F (or R) (5/9)(DF) change in deg. C (or K) 1.8(DC) change in deg. F. - Top - Geometric Conversions - Force and Stress Conversions - Same System Conversions - - Pounds, Newtons & Kilograms; Density - Temperature - Unit Weight of sand in different unit like kg/m3, kn/m3, kg/ft3, g/cm3, cft and lb/ft3, in this article we know about Unit Weight of M sand and river sand in kg/m3. The first thing is unit weight is as same as Specific Weight. And the specific weight of a sand is actually the product of its density and the standard gravity. Unit Weight of sand in different unit like kg/m3, kn/m3, kg/ft3, g/cm3, cft The density of the sand is the per unit volume, calculated in the unit of kg/m3 or lb/ft3 (pcf). The standard gravity is usually given in m/s2 of ft/s2, and on Earth usually taken as 9.82 m/s2. In this article, details about unit weight of sand, how to determine it, and typical unit weight values of different sand types will be presented. ◆You Can Follow me on Facebook and Subscribe our Youtube Channel You should also visits:- 1)what is concrete and its types and properties 2) concrete quantity calculation for staircase and its formula Specific Weight or Unit weight of Sand Unit weight or Specific Weight of sand is calculated by the product of the density of sand and the standard gravity of sand. In another word, the Unit weight of sand is the ratio of the total weight of sand to the total volume of sand. Unit Weight of sand is ranging between 1540 – 2000 kg/m3 based on dry and wet condition,1540 – 1600 kg/m3 is Unit Weight of dry sand and wet sand unit weight is ranging between 1760 – 2000 kg/m3. Unit weight, is usually determined in the laboratory by measuring the weight and volume of a relatively undisturbed soil sample obtained from a brass ring. Measuring the unit weight of soil in the field may consist of a sand cone test, rubber balloon, or nuclear densometer. How to calculate Unit Weight of sand? How to Calculate the Unit Weight of Sand? To calculate the unit weight of sand, we have to know some information, the volume of one unit of sand, the composition of the sand, and the mass densities of each component. Sand weight calculator also has to be taken. 1) We have to know the constituent materials of the substance. In the Sand, assumed it was a mixture of the minerals olivine and basalt. For other types of sand, may have mixtures of quartz, gypsum, or silica. 2) We have to know the volumetric percentage of each constituent material in one unit of the substance. 3) We have to know the mass densities (or specific gravity) of the constituent materials. 4) From the volume and the mass densities, now we can determine the mass of each material. Now by adding the masses to get the total mass of the substance, which is proportional to the total weight. Unit Weight of sand in different unit like kg/m3, kn/m3, kg/ft3, g/cm3, cft and lb/ft3 Unit Weight of sand is ranging between 1540 – 2000 kg/m3 based on dry and wet condition,1540 – 1600 kg/m3 is Unit Weight of dry sand and wet sand unit weight is ranging between 1760 – 2000 kg/m3. Unit weight of sand is around 1680kg/m3 or measured in other units- 16.4808 in kn/m3, 104.832 in lb/ft3, 1.68 in g/cm3 and 47.54 in kg/ft3. Unit weight of M sand is around 1750kg/m3 or measured in other units- 17.16 in kn/m3, 109.2 in lb/ft3, 1.75 in g/cm3 and 49.52 in kg/ft3. Unit weight of river sand is around 1710kg/m3 or measured in other units- 16.78 in kn/m3, 106.7 in lb/ft3, 1.71 in g/cm3 and 48.40 in kg/ft3. Disclaimer:- Please note that the information in Civilsir.com is designed to provide general information on the topics presented. The information provided should not be used as a substitute for professional services. 1. The moist unit weight of the soil is 19.2 kN/m3. Given that Gs=2.69 and water content is 9.8%. Determine: a. Dry unit Views 1,669 Downloads 124 File size 134KB Report DMCA / Copyright DOWNLOAD FILE 1. The moist unit weight of the soil is 19.2 kN/m3. Given that Gs=2.69 and water content is 9.8%. Determine: a. Dry unit weight Ans. 17.49 kN/m3 b. Void ratio Ans. 0.508 c. Porosity Ans. 0.337 d. Degree of saturation Ans. 51.89% 2. For a given soil, the following are known. Gs= 2.74, moist unit weight = 20.6 kN/m3, and the moisture content is 16.6%. a. Determine the dry unit weight Ans. 17 67 kN/m3 b. Determine the void ratio Ans. 0.52 c. Determine the porosity Ans. 0.34 d. Determine the degree of saturation Ans. 87.5 % e. Determine the weight of water in kN to be added per cubic meter of soil for 100% degree of saturation. Ans. 0.44 kN 3. For a given soil sample it has a sp. gr. of 2.74, moisture content of 16.6% and a moist unit weight of 20.6 kN/m3. a. Compute the porosity of the soil sample. Ans. 0.34 b. Compute the buoyant unit weight of the soil sample. Ans. 11.23 kN/m3 c. Compute the weight of water in kN to be added per cu.m. of soil for 99% degree of saturation. Ans. 0.10 kN/m3 4. The unit weight of soil is 15.10 kN/m 3. The moisture content of the soil is 17% when the degree of saturation is 60%. Determine the following. a. Void ratio Ans. 0.59 b. Sp. gr. of soil Ans. 2.08 c. Saturated unit weight Ans. 16.47 kN/m3 5. A sand with Gs=2.66 and void ratio e=0.60 is completely dry. It then becomes wetted by a rising ground water table .Compute the unit weight in kN/m3 under the following conditions: a. When the sand is completely dry. Ans. 16.31 kN/m3 b. When the sand is 40% saturated. Ans. 17.78 kN/m3 c. When the sand is completely saturated. Ans. 19.99 kN/m3 6. A saturated soil has a moisture content of 38% and a specific gravity of 2.73. a. Compute the void ratio Ans. 1.04 b. Compute the porosity Ans. 0.51 c. Compute the moist unit weight in kN/m3 of the soil. Ans. 18.12 kN/m3 7. The moist weight of 0.0057 m3 of a soil is 102.6 N. The moisture content and the specific gravity of soil solids are determined in the laboratory to be 11% and 2.7 respectively. Calculate the following: a. Moist unit weight Ans. 18 kN/m3 b. Dry unit weight Ans. 16.22 kN/m3 c. Void ratio Ans. 0.63 d. Porosity Ans. 0.39 e. Degree of saturation Ans. 47.14% 8. In its natural state, a moist soil has a volume of 0.00935 m3 and weighs 178 N. The oven dried weight of the soil is 154 N. If Gs= 2.67, determine the following: a. Moisture content Ans. 19.04 kN/m3 b. Moist unit weight Ans. 16.47 kN/m3 c. Dry unit weight Ans. 0.59 d. Void ratio Ans. 0.37 e. Degree of saturation Ans. 70.6% 9. The dry density of a sand with a porosity of 0.378 is 1600 kg/m3. Determine the following: a. Void ratio Ans. 0.631 b. Sp.gr. of soil Ans. 2.61 c. Saturated unit weight of soil in kN/m3 Ans. 19.49 kN/m3 10. The moist unit weight of a soil is 16.5 kN/m3. If the water content is 15% and sp.gr. of soil is 2.7, determine the following: a. Dry unit weight Ans. 14.35 kN/m3 b. Porosity Ans. 0.458 c. Degree of saturation Ans. 47.9% d. Mass of water in kg/m3 to be added to reach full saturation Ans. 238.5 kg/m3 11. For a given sandy soil, emax= 0.75, emin= 0.46 and Gs= 2.68. If the relative density of the soil Dr= 78% and its water content is 9%, determine the following: a. In situ void ratio Ans. 0.524 b. Moist unit weight of compaction to kN/m3 Ans. 18.8 kN/m3 c. Dry unit weight Ans. 17.25 kN/m3 12. A loose, uncompacted sand fill 1.8 m. depth has a relatively density of 40% Laboratory tests indicated that the minimum and maximum void ratios of the sand are 0.46 and 0.90 respectively. Specific gravity of the solids of the sand is 2.65. a. Determine the void ratio of the sand having a relative density of 40%. Ans. 0.724 b. What is the dry unit weight of the sand Ans. 15.08 kN/m3 c. If the sand is compacted to a relative density of 75%, what is the decrease in the thickness of the fill 1.8m. fill? Ans. 160.79 mm 13. A sample of sand has a relative density of 40% with a solid specific gravity of 2.65. The minimum void ratio is 0.45 and the max. void ratio is 0.97. a. Determine the void ratio of the sand having a relative density of 40%. Ans. 0.762 b. What is the density of this sand in a saturated condition? Ans. 120.pcf c. If the sand is compacted to a relative density of 65%, what will be the decrease in thickness of a 4ft. thick layer? Ans. 3.54 inches 14. For a sandy soil, the following are given: emax= 0.66, emin= 0.36 and K at a relative density of 90% = 0.008 cm/sec. Determine the value of K at a relative density of 50%. Ans. 0.0136 cm/sec. 15. The moist unit weight of 0.00283 m3 of the soil is 54.4 N If the moisture content is 12% and the specific gravity of soil solids is 2.72, determine the following: a. Moist unit weight Ans. 19.22 kN/m3 b. Dry unit weight Ans. 17.16 kN/m3 c. Void ratio Ans. 0.55 d. Porosity Ans. 0.35 e. Degree of saturation Ans. 59.3% f. Volume occupied by water Ans. 0.00059 m3 16. For a moist soil, the following are given: Vol. = 1.2 m3, weighs = 23.04 kN, water content = 8.6% and Gs = 2.71. Determine the following: a. Unit weight Ans. 19.2 kN/m3 b. Dry unit weight Ans. 17.68 kN/m3 c. Void ratio Ans. 0.504 d. Porosity Ans. 0.335 e. Degree of saturation Ans. 46.2% f. Vol. occupied by water Ans. 0.186 m3 17. For a saturated soil, the following are given: water content = 23%, Gs = 2.67. Determine the following: a. Saturated unit weight Ans. 19.96 kN/m3 b. Dry unit weight Ans. 16.23 kN/m3 c. Moist unit weight when the degree of saturation becomes 70% Ans. 18.84 kN/m3 18. The dry density of a soil is 1750 kg/m3 Specific gravity of soil is 2.66. Determine the following: a. Moisture content when it is saturated. Ans. 19.55% b. Saturated unit weight Ans. 20.52 kN/m3 c. Effective unit weight of soil is kN/m3. Ans. 10.71 kN/m3 19. The porosity of a soil is 0.35 and Gs= 2.69. Determine the following: a. Saturated unit weight Ans. 20.58 kN/m3 b. Bouyant unit weight Ans. 10.77 kN/m3 c. Moisture content when the moist unit weight is 17.5 kN/m3 20. The moist unit weight and degree of saturation of a soil are given in the following table. Y(kN/m3) Degree of Sat. (S) 16.64 kN/m3 50 3 17.73 kN/m 70 Determine the following: a. Void ratio Ans. 0.80 b. Sp.gr. of soil Ans. 2.65 c. Saturated unit wt. Ans. 18.80 kN/m3 21. For sandy soil, emax= 0.86, emin= 0.43 and Gs= 2.66. a. What is the void ratio at Dr= 56% Ans. 0.62 b. What is the moist unit weight of soil when water content is 7%. Ans. 17.24 kN/m3 c. What is the degree of saturation. Ans. 30% 22. A soil sample has the following properties: Porosity= 0.398 Specific gravity = 2.75 a. Compute the void ratio of the soil sample. Ans. 0.66 b. Compute the saturated unit weight of the soil sample. Ans. 20.15 kN/m3 c. Compute the effective unit weight of the soil sample. Ans. 10.43 kN/m3 23. A soil sample taken from the ground has moisture content of 12% and degree of saturation of 25%. If its specific gravity is 2.7. Determine the following: a. Void ratio Ans. 0.62 b. Saturated unit wt. Ans. 20.10 kN/m3 c. Bouyant unit weight Ans. 10.29 kN/m3 24. A soil sample has a dry unit weight of 17.1 kN/m3, a void ratio of 0.52 and water content of 12.5%. Determine the following: a. Sp.gr. of soil Ans. 2.65 b. Submerged unit wt. of soil Ans. 10.65 kN/m3 c. Dry unit weight at zero air voids. Ans. 19.53 kN/m3 25. The volume of the soil sample measured before drying is 110 cm3. The wet unit weight of soil is 207 g and the dries wet of the soil sample is 163 g. If the sp.gr. of the soil is 2.68, Determine the following: a. Void ratio Ans. 0.81 b. Degree of saturation Ans. 89.3 % c. Dry unit weight at zero air voids. Ans. 15.25 kN/m3 26. The field unit weight of the soil sample is 1960 kg/m3, and the unit weight of the soil particle is 2700 kg/m3. If the emax= 0.69 and emin= 0.44. a. Compute the dry unit weight in kN/m3 if the water content is 11%. Ans. 17.32 kN/m3 b. Compute the void ratio of the soil sample. Ans. 0.53 c. Compute the relative density of the soil sample. Ans. 64% 27. The field weight of the soil sample is 1900 kg/m3, and the unit weight of the soil particle is 2600 kg/m3. a. Compute the dry unit weight if the moisture content is 11.5% Ans. 1704 kg/m3 b. Compute the void ratio Ans. 0.525 c. Compute the degree of saturation Ans. 56.95% 28. A soil sample has a mass of 1830 g. taken from the field having a volume of 1x10-3m3. It has a sp.gr. of 2.60 and a water content of 10 %. Values of emax= 0.62 and emin= 0.43. a. Compute the dry unit weight Ans. 1664 kg/m3 b. Compute the void ratio Ans. 0.56 c. Compute the relative density Ans. 32% 29. A saturated clay layer has thickness of 6m. with a water content of 24.2% with a sp.gr. of 2.70. a. Compute the total density of the clay layer. Ans. 19.92 kN/m3 b. Compute the total stress at the bottom. Ans. 119.52 kPa c. Compute the effective stress at the bottom. Ans. 60.66 kPa 30. The void ratio of a soil is 0.58 and its specific gravity is 2.7. a. Compute the moisture content Ans. 22.5% b. Compute the saturated unit weight Ans. 20.37 kN/m3 c. Compute the dry unit weight Ans. 16.76 kN/m3 31. The field weight of the soil sample is 1900 kg/m3, and the unit weight of the soil particle is 2660 kg/m3. a. Compute the dry unit weight if the moisture content is 11.5% Ans. 1704 kg/m3 b. Compute the void ratio Ans. 0.561 c. Compute the degree of saturation Ans. 54.53% 32. A soil sample has a mass of 1830 g. taken from the field having a volume of 1x10-3m3. It has a sp.gr. of 2.60 and a water content of 10 %. Values of emax= 0.63 and emin= 0.44. a. Compute the dry unit weight Ans. 1664 kg/m3 b. Compute the void ratio Ans. 0.56 c. Compute the relative density Ans. 36.8% 33. A saturated clay layer has thickness of 10m. with a water content of 51% and a sp.gr. of 2.72. a. Compute the saturated unit weight of the clay. Ans. 16.87 kN/m3 b. Compute the total stress at the bottom. Ans. 168.7 kPa c. Compute the effective stress at the bottom. Ans. 70.6 kPa 34. A dry soil is mixed with 17% by a mass with water and compacted. Volume of wet soil is 0.001 m3 and has a mass of 1.6 kg. If the specific gravity of soil is 2.70. a. Compute the dry unit weight of soil. Ans. 13.42 kN/m3 b. Compute the void ratio Ans. 0.97 c. Compute the degree of saturation Ans. 47.3% 35. A dry soil is mixed with 30% by a mass with water and compacted. Volume of wet soil is 0.00144 m3 and has a mass of 2.5 kg. If the specific gravity of soil is 2.70. a. Compute the dry density. Ans. 13.1 kN/m3 b. Compute the void ratio Ans. 1.02 c. Compute the degree of saturation Ans. 79.4% 36. A saturated soil sample has the following data: Water content =34% Void ratio = 0.92 a. Sp.gr. of soil Ans. 2.71 b. Effective unit weight Ans. 8.74 kN/m3 c. Moist unit weight Ans. 18.55 kN/m3 37. The net weight of a soil specimen before drying is 207 gr. and its dried weight after drying in an oven is 163 gr. The volume of the specimen before drying is 120 cm3. Sp.gr. of soil sample is 2.62. a. Compute the moisture content of the soil. Ans. 27% b. Compute the void ratio Ans. 0.93 c. Compute the degree of saturation Ans. 76.1% 38. The porosity of the soil is 0.35 and its moist unit weight is 17.5 kN/m3. The sp.gr. of the soil is 2.69. a. What is the moisture content of the soil. Ans. 2.13% b. Compute the degree of saturation Ans. 10.62% c. Compute the saturated unit weight of the soil. Ans. 20.58 kN/m3 39. The effective unit weight of soil is 10.29 kN/m3. Void ratio of the soil is 0.62. a. Compute the sp.gr. of the soil. Ans. 2.70 b. If the water content of the soil is 14%, compute for the degree of saturation. Ans. 60.97% c. Compute the bulk density of the soil. Ans. 2kg/m3 40. For sandy soil, emax= 0.75, emin= 0.52 and Gs= 2.70 a. What is the void ratio of the soil at Dr=65% Ans. 0.60 b. What is the dry unit weight of soil? Ans. 16.55 kN/m3 c. What is the zero air void unit weight? Ans. 15.08 kN/m3 41. A granular soil was tested in the laboratory and found to have a max. and min. void ratios of 0.84 and 0.38 respectively. If the relative density of the soil is 69.6 %, sp.gr. of soil is 2.70. a. Compute the in situ void ratio of the soil Ans. 0.52 b. Compute the dry unit weight Ans. 17.43 kN/m3 c. Compute the effective unit wt. of soil Ans. 10.99 kN/m3 42. A soil has a moisture content of 18.2% and a degree of saturation of 80%. If the void ratio is o.607. a. Compute the sp.gr. of the soil. Ans. 2.67 b. Compute the moist unit weight of the soil Ans. 19.27 kN/m3 c. Compute the saturated unit weight of the soil. Ans. 20 kN/m3 43. For a given sandy soil with max. and min. void ratios of 0.75 and 0.46 respectively has a sp.gr. of 2.68. If the density index is 78% and a moisture content of 9%. a. What would be the in situ void ratio. Ans. 0.5238 b. Determine the degree of saturation of the soil. Ans. 46.05% c. What will be the moist unit wt. of compaction in the field? Ans. 18.81 kN/m3 44. A sample of the soft saturated clay has a volume of 100 cu.cm. and weighs 175 gr. If the oven dry weight is 120 gr. a. Compute the water content of clay. Ans. 45.8% b. Compute the void ratio of the clay. Ans. 1.22 c. Compute the sp.gr. of the clay. Ans. 2.66 45. A sample of uniform sand has a porosity od 43%. From the lab test, the value of the void ratio in the loosest condition is 0.85 and a void ratio of 0.35 in the densest condition. If the water content is 12% and Gs=2.7. Determine the following: a. Density index Ans. 19.2% b. Degree of saturation Ans. 42.97% c. Moist unit weight Ans. 16.91 kN/m3 46. The critical hydraulic gradient for a soil sample is equal to 1.02.If the specific gravity of soil sample is 2.67 and the water content is 14%. a. Compute the void ratio of the soil sample. Ans. 0.64 b. Compute the degree of saturation. Ans. 58.40% c. Dry unit weight at zero air voids: Ans. 19.70 kN/m3 47. The dry unit weight of soil at zero air voids is equal to 19 kN/m3. The soil has a water content of 12% and a degree of saturation of 58%. Compute the following: a. Specific gravity Ans. 2.52 b. Void ratio Ans. 0.52 c. Porosity Ans. 0.342 48. A sample of sand has a moisture of 14% and a unit wt. of 18.88 kN/m3. Laboratory test on dried sample indicated values of emin= 0.50 and emax= 0.85 for the densest and loosest state respectively. Specific gravity = 2.65. Determine the following: a. Void ratio Ans. 0.57 b. Degree of saturation Ans. 65.09% c. Density index Ans. 0.80 49. In its natural state a moist soil has a volume of 0.009 m3 and weighs 180 N. The oven dried weight of the soil is 150 N. If the soil has Gs= 2.67, compute the following: a. Moisture content Ans. 20% b. Void ratio Ans. 0.59 c. Degree of saturation Ans. 91.53% 50. The moist unit weight of soil is 17 kN/m3 with a moisture content of 14%. If its sp.gr.= 2.7, compute the following: a. Void ratio Ans. 0.78 b. Porosity Ans. 0.438 c. Degree of saturation Ans. 48.46% 51. A sample of saturated clay has a water content of 56%. Assume Gs=2.72. Compute the following. a. Void ratio Ans. 1.52 b. Saturated unit weight Ans. 106.16 lb/ft3 c. Porosity Ans. 60.3% 52. The weight of the soil before drying is 200 gr. and its dried weight after drying is 160 gr. Sp.gr. of soil = 2.6 Vol. of soil before drying is 120 cm3. Compute the following: a. Water content Ans. 25 % b. Void ratio Ans. 0.95 c. Degree of saturation Ans. 68.4% 53. A soil sample has a weight of 120 gr. before it was placed on the oven after drying for 20 min. it weighs only 100 gr. Specific gravity of soil sample is 2.6. Volume of soil speciment before drying is 66 cm3. a. Compute the water content. Ans. 20% b. Compute the void ratio. Ans. 0.72 c. Compute the degree of saturation. Ans. 72.2% 54. A silty soil has a void ratio in the loosest condition equal to 0.86 and a void ratio of 0.30 in the densest condition. If the relative density of sand is 54%, compute the following: a. In situ void ratio Ans.0.56 b. Porosity Ans. 0.36 c. If the dry unit wt. of the silty sand is 16.85 kN/m3, compute the specific gravity off the sand. Ans. 2.68 55. The dry unit weight of a silty sand is 16.43 kN/m3.It has a specific gravity of 2.65. The silty sand has a void ratio in the loosest condition equal to 0.88 and a void ratio of 0.36 in the densest condition. a. Compute the relative density of the sand. Ans. 57.6% b. Compute the porosity of the silty sand. Ans. 0.367 c. Compute the degree of saturation if the water content is 16%. Ans. 73.1% 56. The volume of soil sample before drying is 108 cm3 and the volume of the dried soil is 61 cm3. Sp.gr. of soil is 2.7. Compute the following: a. Void ratio Ans. 0.77 b. Porosity Ans. 0.435 c. Degree of saturation if it has a moisture content of 21.6%. Ans. 75.7 57. The mass of a dried soil sample is determined to be 250 g. When immersed in the soil particles displaces 95cm3. And this is then the volume of soil solids. Using this data, determine the following if the soil sample has a water content of 12.4%. a. Dry bulk sp.gr. Ans. 2.63 b. Dry density Ans. c. Degree of saturation if the void ratio is 0.42. Ans. 77.65% 58. A dry sand is placed in a container having a volume of 0.0089 cm3. The dry weight of the sample is 0.014 gr. Water is carefully added to the container so as not to disturbed the condition of the sand. When the container is filled, the combined weight of soil plus water is 0.0174 gr. a. Find the void ratio of the soil in the container. Ans. 0.62 b. Find the porosity Ans. 0.38 c. Find the water content Ans. 24.3% d. Find the sp.gr. of the soil particle. Ans. 2.55 e. Find the saturated unit weight of the soil. Ans. 19.20 kN/m3 f. Find the effective unit weight of the soil. Ans. 9.39 kN/m3 g. Find the dry unit weight of soil. Ans. 15.44 kN/m3 59. An undisturbed soil sample in saturated condition has a void ratio of 0.81 and sp.gr. of 2.69. Find the following: a. Water content Ans. 30.1% b. Saturated unit wt. Ans. 18.97 kN/m3 c. Dry unit weight Ans. 14.58 kN/m3 60. A dry sand is placed in a container having a volume of 0.3 ft3.. The dry weight of the sample is 31 lb. A volume of 0.051 ft3 of water is carefully added to the container so as not to disturb the condition of the sand. If the sp.gr. of sand is 2,72, Determine the: a. Porosity Ans. 0.39 b. Degree of saturation Ans. 0.436 c. Bulk sp.gr. Ans. 1.66 61. Laboratory test data on a sample of saturated soil show that the void ratio is 0.45 and the specific gravity of solids is 2.65. For these conditions, determine the following: a. Water content Ans. 17% b. Saturated unit wt. Ans. 20. 97 kN/m3 c. Dry unit weight Ans. 17.93kN/m3 62. A soil sample has a bulk unit weight of 19.6 kN/m3. At a water content of 10%. Determine the following if it has a sp.gr. =2.7. a. Void ratio Ans. 0.486 b. Percentage air in voids Ans. 14.5% c. Degree of saturation Ans. 55.6% 63. The weight of a chunk of moist soil 208 g and the volume of the soil chunk measured before drying is 120 cm3. After being dried out in an oven, the weight of the dried soil is 170 g. Specific gravity of soil is 2.65. a. Compute the water content of the soil. Ans. 22.35% b. Compute the void ratio. Ans. 0.87 c. Compute the degree of saturation. Ans. 68.04% 64. For a compacted soil, specific gravity Gs=2.72, water content= 18%, Yd= 0.9 Yzav a. Compute the zero air void unit wt. Ans. 17.91 kN/m3 b. Compute the dry unit weight. Ans. 16.12kN/m3 c. Compute the degree of saturation. Ans. 74.18% 65. For a sandy soil, emax= 0.72, emin= 0.46 and Gs= 2.68. a. What is the moist unit weight of the compaction in the field if Dr= 78% and water content of 9%, Ans. 18.89 kN/m3 b. Compute the saturated unit weight. Ans. 20.67 kN/m3 c. Compute the degree of saturation. Ans. 46.64% 66. A soil at a constant moisture content shows the following when compacted Degree of saturation Saturated unit wt. 40% 14.50 kN/m3 70% 17.89 kN/m3 a. Determine the specific gravity of soil Ans. 2.64 b. Determine the moisture content of soil Ans. 11.86% c. Determine void ratio of the 17.89 kN/m3 soil. Ans. 0.447 67. An undisturbed sample of fine sand is tested in the laboratory and is found to have a dry weight of 35.67 N, a total volume of 0.00198 m3 and a sp.gr. of 2.70. Other laboratory test were performed to determine the maximum and minimum density for a sand. At the maximum density, it has a void ratio of 0.35, at the minimum density, the void ratio is 0.95. a. Determine the volume of voids. Ans. 0.00135 m3 b. Determine the void ratio. Ans. 0.467 c. Determine the relative density of the undisturbed sample. Ans. 80.5% 68. A sample of sand above the water table was found to have a natural moisture content of 15% and a unit weight of 120 pcf. Laboratory tests on a dried sample indicated values of emin= 0.50 and emax= 0.85 for the densest and loosest state respectively. a. Compute the void ratio Ans. 0.587 b. Compute the degree of saturation Ans. 68% c. Compute the density index Ans. 0.75 69. A granular soil(sand) was tested in the laboratory and was found to have max. and min. void ratios of 0.84 and 0.38 respectively. The sp.gr. of the soil is 2.65. If the moisture content is 9% and its moist unit weight is 18.64 kN/m3. a. Compute the dry unit weight of soil. Ans. 17.1 kN/m3 b. Compute the void ratio. Ans. 0.52 c. Compute the relative density of the soil in the field. Ans. 69.6% 70. A granular soil located in a borrow pit is found to have an in place dry density 1895 kg/m3. In the laboratory, values of dry maximum density and minimum density are determined as 2100 kg/m3 and 1440 kg/m3 respectively. a. Compute the relative density of the soil in the borrow pit. Ans. 76.4% b. Compute the void ratio of the soil in the natural condition if the maximum and minimum densities indicate void ratios of 0.28 at the max. density and 0.92 at minimum density. Ans. 0.431 c. Compute the specific gravity of this soil. Ans. 2.71 71. A cubic meter of soil in its natural state weighs 17.75 kN; after being dried, it weighs 15.08 kN. The specific gravity of soil is 2.70. a. Compute the moisture content. Ans. 17.7% b. Compute the dry unit weight. Ans. 15.08 kN/m3 c. Compute the void ratio Ans. 0.756 72. Following are the results of a field unit weight determination test using the sand cone method. Dry unit weight of sand = 16.36 kN/m3 Wt. of sand to fill the cone= 11.15 N Wt. of jar+cone+sand(before use)= 58.9 N Wt. of jar+cone+sand(after use)= 27.65 N Wt. of moist soil from hole= 32.55 N Moisture content of moist soil = 11.6% a. Compute the weight of sand to fill the hole. Ans. 0.0301 kN b. Compute the dry weight of soil from the field. Ans. 29.17 N c. Compute the dry unit weight of compaction in the field. Ans. 15. 854 kN/m3 73. The weight of the moist soil as excavated from a hole is 895 g with a volume of 426 cm3. After drying its weight was only 779 g. Of the dried soil only 400 grams was poured into a vessels in a very loose state, and its volume was subsequently determined to be 276 cm3. That same 400 g dried soil was then vibrated and tamped to a volume of 212 cm3. a. Compute the min. dry unit weight. Ans. 1.45 b. Compute the max. dry unit weight. Ans. 1.89 c. Compute the relative density of the soil sample. Ans. 89.2% 74. A sample of soil weighing 2.62 kN is removed from a test pit 1.33 kN of water will just fill the pit. A sample of the soil weighing 112.4 grams is dried in the oven and its weight after drying is 103.6 grams. Assume the specific gravity of the solids is 2.67. Max. attainable unit weight of the soil is 18. 47 kN/m3 and minimum attainable unit weight is 16.35 kN/m3. a. Determine the wet unit weight of soil. Ans. 19.26 kN/m3 b. Determine the dry unit weight of soil. Ans. 17.75 kN/m3 c. Determine the relative density of the soil sample. Ans. 67.36% 75. A hand carved sample of soft saturated clay has a volume of 100 cu.cm. and weighs 175 grams. If the oven-dry weight is to be 120 grams. a. Compute the volume of voids. Ans. 55 cu.cm. b. Compute the dry unit weight. Ans. 15.08 kN/m3 c. Compute the void ratio. Ans. 0.756 76. In the specific gravity test the following data were recorded. Mass of pycnometer jar = 530 g Mass of pycnometer jar when full of clean water = 1560 g Mass of pycnometer containing soil only = 980 g Mass of pycnometer jar containing soil and topped with water = 1840 g a. Compute the sp.gr. of the soil particles. Ans. 2.65 b. Compute the dry unit weight if the void ratio is 0.40. Ans. 19 kN/m3 c. Compute the degree of saturation if the moisture content is 12%. Ans. 80% 77. In a core-cutter test a steel cylinder having a mass of 1472 g, an internal diam. of 102 mm and a length of 125 mm was rammed into an in-situ soil mass. After removing it and trimming the ends flat, its mass was found to be 3482 g. The moisture content of the soil was later found to be 16.4%. If the sp.gr. of the soil is 2.70. a. Determine the bulk density. Ans. 1.97 g/cm3 b. Determine the dry density. Ans. 1.69 g/cm3 c. Determine the degree of saturation if the void ratio is 0.60. Ans. 74% 78. A soil having a sp.gr. of 2.67 has a weight of 178 N in its natural state and a volume of 0.00935 m3. The soil has a dry unit weight of 16.47 kN/m3. a. Compute the water content. Ans. 15.9% b. Compute the porosity of the soil. Ans. 0.371 c. Compute the degree of saturation. Ans. 70.6% 79. The hydraulic gradient for quicksand condition is equal to 1.13. with a void ratio of 0.50. The moist unit weight of soil is 19.04 kN/m3. a. Compute the sp.gr. of the soil. Ans. 2.70 b. Compute the dry unit weight of soil. Ans. 17.66 kN/m3 c. Compute the water content of the soil. Ans. 7.8% 80. A soil sample has a dry unit weight of 17.79 kN/m3 and void ratio of 0.50. a. Find the sp.gr. of soil. Ans. 2.72 b. Find the hydraulic gradient at quicksand condition. Ans. 1.15 c. Find the effective unit weight. Ans. 11.25 kN/m3 81. A sample of the soft saturated clay has a natural water content of 43%. The specific gravity of the solid matter is 2.70. Compute the following: a. Void ratio Ans. 1.16 b. Porosity Ans. 0.54 c. Saturated unit weight Ans. 112 pcf 82. A soil sample weighing 11.23 lb. has a volume of 0.092 cu.ft. If water content= 13.4 % and Gs= 2.65, compute the following: a. Unit weight of soil Ans. 122.1 pcf b. Dry unit weight Ans. 107.6 pcf c. Void ratio Ans. 0.539 d. Porosity Ans. 35.0% e. Degree of saturation Ans. 65.88% 83. The dry density of a compacted sand sample is 125 lb/ft3. If the sp.gr. is 2.65, compute the following: a. Void ratio Ans.0.325 b. Water content of the material in a saturated condition. Ans. 12.26% c. Unit weight if degree of saturation= 20% Ans. 128.1 lb/ft3. 84. A 50 cm3 sample of moist clay was obtained by pressing a sharpened hollow cylinder into the wall of a test pit. The extruded sample had an initial weight of 85 g and after oven-drying a weight of 60 g. Assuming Gs= 2.70. a. Compute the water content Ans. 41.7% b. Compute the void ratio Ans. 1.25 c. Compute the degree of saturation Ans. 90% d. Compute the dry density Ans. 75pcf 85. A hand-carved sample of soft saturated clay has a volume of 100 cu.cm. and weighs 175 g. If the oven dry weight is found to be 120 g. Compute the following: a. Water content Ans. 45.8% b. Void ratio Ans. 1.22 c. Specific gravity Ans. 2.66 86. A sample of moist quartz sand was obtained by carefully pressing a sharpened hollow cylinder with a volume of 150 cu.cm. into the bottom of an excavation. The sample was trimmed flushed flush with the ends of the cylinder and the total weight was found to be 325 g. In the laboratory the dry weight of the sand alone was found to be 240 g. and the weight of the empty cylinder 75 g. Laboratory test on the dry sand indicated emax= 0.80 and emin= 0.48, Gs= 2.66. Compute the following: a. Water content Ans. 4.17% b. Void ratio Ans. 0.663 c. Degree of saturation Ans. 16.76 d. Density index of the sand in the field Ans. 0.428 87. The natural water content of a saturated sample of clay is 400%. If specific gravity Gs= 2.40, compute the following: a. Void ratio Ans. 9.6 b. Saturated density Ans. 70.8 lb/ft3. c. Porosity Ans. 90.6% 88. A soil sample has a natural water content of 22.5 % and it is known to have a sp.gr. of 2.60. In order to determine the moist density of the soil, a portion of soil weighing 224 g is put in a 500cm3 container. It is filled with 382 cm3 of water to fill the container. a. Compute the porosity of the soil. Ans. 0.404 b. Compute the degree of saturation Ans. 86.28 % c. Compute the bulk sp. gr. Ans. 1.55 89. A soil sample has a natural water content of 22.5 % and it is known to have a sp.gr. of 2.60. In order to determine the moist density of the soil, a portion of soil weighing 224 g is put in a 500cm3 container. It is filled with 382 cm3 of water to fill the container. a. Determine the moist unit weight of soil. Ans. 18.62 kN/m3 b. Determine the dry unit weight of soil. Ans. 15.2 kN/m3 c. Determine the void ratio. Ans. 0.678. 90. A moist sample having a volume of 1.4 m3 has a total mass of 2400 kg. Specific gravity of soil is 2.70. If the water content is 9%. a. Compute the dry density of soil. Ans. 1572.7 kg/m3 b. Compute the degree of saturation. Ans. 33.89% c. Compute the volume of water in the soil sample. Ans. 0.1982 m3 91. A soil has a dry density of 1600 kg/m3 and a void ratio of 0.63. a. Compute the specific gravity of the soil. Ans. 2.61 b. Compute the saturated unit weight of soil. Ans. 19.50 kN/m3 c. Compute the degree of saturation if it has a water content of 14%. Ans. 58% 92. A soil having a sp.gr. of 2.74 has a moist unit weight of 20.6 kN/m3 and a moisture content of 16.6 %. a. Compute the void ratio. Ans. 0.52 b. Compute the degree of saturation. Ans. 87.47% c. Compute the weight of water in kN to be added per cu.cm of soil for 100% degree of saturation. Ans. 0.44 93. A saturated soil having a specific gravity of 2.67 has a moisture content of 23%. a. Compute the saturated unit weight. Ans. 19.99 kN/m3 b. Compute the dry unit weight. Ans. 16.27 kN/m3 c. Compute the moist unit weight when degree of saturation becomes 70%. Ans. 18.87 kN/m3 94. The total weight of soil when saturated 1526 g and the weight of the soil after drying is 1053g. If the specific gravity of soil is 2.84. a. Compute the moisture content. Ans. 44.9% b. Compute the void ratio. Ans. 1.28 c. Compute the porosity. Ans. 0.56

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